Amendments to the Specification:

Please amend the specification as follows:

Please replace paragraph 0002 with the following rewritten paragraph:

A Japanese Patent Application First Publication No. Heisei 10-007010 published on January 13, 1998 (which corresponds to a United States Patent No. 5,957,987 issued on September 28, 1999) exemplifies a previously proposed vehicular motion control apparatus. In the above-identified Japanese Patent Application First Publication, a vehicular yaw rate and so on are controlled during a steering operation (maneuver) so that a vehicular stability during a steering wheel operation is maintained. Specifically, a target yaw rate for a response characteristic related to a plane motion of the vehicle on the basis of the steering angle and the vehicle speed ~~vehicular velocity~~ to coincide with a predetermined response characteristic is calculated, a rear road wheel steering angular command value required to make the yaw rate developed on the vehicle coincident with its target value is calculated in accordance with a motion equation based on a vehicular specification value. Rear road wheel actual steering angles are controlled to follow a rear road wheel steering angle command value. Thus, this control results in a yaw motion in accordance with a target yaw rate.

Please replace paragraph 0004 with the following rewritten paragraph:

However, in the above-described vehicular motion control apparatus, the vehicle ~~vehicular~~ speed dependent constants are stored as skip values (discrete values and not continuous values) as a map stored previously for each vehicle speed. In a case where the vehicle speed during the calculation of the target yaw rate is not coincident with a point on a map axle, a straight line (linear) interpolation is carried out on the basis of points mutually adjacent points on the map to calculate the corresponding vehicle speed dependent constant. Hence, an error due to the execution of the straight line (linear) interpolation gives an ill influence on the target yaw rate. Consequently, there is a high possibility of giving an ill influence on the rear road wheel steering angle. Hence, in a case where the vehicle speed ~~vehicular velocity~~ is varied during the steering operation such as a turning braking, the rear

road wheel steering angles provide motions other than a desired motion so that there is a possibility that the driver gives an unpleasant feeling (the sense of incompatibility).

Please replace paragraph 0006 with the following rewritten paragraph:

The above-described object can be achieved by providing a vehicular motion control apparatus, comprising: a steering angle detecting section that detects a vehicular steering angle; a vehicle speed detecting section that detects a vehicle speed; a vehicular motion control mechanism that is capable of controlling a vehicular motion; a state detecting section that detects a state of the vehicular motion control mechanism; a vehicular motion target value calculating section that calculates a target value of the vehicular motion for a response characteristic on a vehicular plane motion to be enabled to provide a predetermined response characteristic on the basis of detection values of the steering angle and the vehicle speed and vehicle speed dependent constants preset in a form of a map for each vehicle speed; a control command value calculating section that calculates a vehicular motion control mechanism command value required to achieve the target value of the vehicular motion; and a servo calculating section that provides a control signal for a rear road wheel steering actuator in such a manner that a detection value of the state of the vehicular motion control mechanism is made coincident with the motion control mechanism command value; and a ~~vehicular~~ vehicle speed ~~velocity~~ variation rate limiter that places a limitation on a vehicle speed variation rate and varies in accordance with the detection value of the vehicular steering angle, the vehicular motion target value calculating section using an output of the vehicle ~~vehicular~~ speed variation rate limiter for a map reference vehicle speed and the control command value calculating section using the output of the vehicle ~~vehicular~~ speed variation rate limiter to the detection value of the vehicle speed for a control command value calculation.

Please replace paragraph 0007 with the following rewritten paragraph:

The above-described object can also be achieved by providing a vehicular motion control method, comprising: detecting a vehicular steering angle; detecting a vehicle speed; providing a vehicular motion control mechanism which is capable of controlling a vehicular

motion; detecting a state of the vehicular motion control mechanism; calculating a target value of the vehicular motion for a response characteristic on a vehicular plane motion to be enabled to provide a predetermined response characteristic on the basis of detection values of the steering angle and the vehicle speed and vehicle speed dependent constants preset in a form of a map for each vehicle speed; calculating a vehicular motion control mechanism command value required to achieve the target value of the vehicular motion; and providing a control signal for a rear road wheel steering actuator in such a manner that a detection value of the state of the vehicular motion control mechanism is made coincident with the motion control mechanism command value; and providing a vehicle speed variation rate limiter to place a vehicle speed variation rate limitation on the detection value of the vehicle speed and varying the vehicle speed variation rate limitation in accordance with the detection value of the vehicular steering angle, at the vehicular motion target value calculation, using an output of the vehicle ~~vehicular~~ speed variation rate limiter for a map reference vehicle speed and, at the control command value calculation, using the output of the vehicle ~~vehicular~~ speed variation rate limiter to the detection value of the vehicle speed for a control command value calculation.

Please replace paragraph 0024 with the following rewritten paragraph:

Fig. 2 shows a functional block diagram of controller 4 shown in Fig. 1. As shown in Fig. 2, a controller 4 includes a vehicular motion target value setting section (vehicular target value calculating section) 41 which receives a front road wheel steering angle detection value θ from a front road wheel steering angle sensor 14 and a vehicle speed detection value V from vehicle speed sensor 16 and calculates a target yaw rate Ψ'^* as a vehicular motion target value and a target yaw angular acceleration Ψ''^*. In addition, a target rear road wheel steering angle calculating section 42 which calculates a target rear road wheel steering angle δ^* on the basis of target yaw rate Ψ'^* and target yaw angular acceleration Ψ''^* derived from vehicular motion target value setting section 41, detection value of the front steering angle θ and vehicle speed ~~vehicular velocity~~ detection value V is functionally provided in controller 4. Controller 4 includes a microcomputer having a CPU (Central Processing Unit), a ROM (Read Only Memory), a RAM (Random Access Memory), an Input Port, an Output Port, a common bus,

and so forth. Furthermore, controller 4 includes a rear road wheel steering angle servo amplifier (amplifying or calculating) section 43 which supplies a control signal to a rear road wheel steering angle steering actuator 11 (namely, drive motor shown in Fig. 1), the control signal being such that rear road wheel steering angle detection signal δ is made coincident with target rear road wheel steering angle δ*.

Please replace paragraph 0025 with the following rewritten paragraph:

Vehicle speed ~~Vehicular velocity~~ motion target value setting section 41 calculates a target yaw rate (yaw velocity) Ψ'* as a vehicular motion target value with respect to a front road wheel angle detection value on the basis of a transfer function between front road wheel steering angle detection value θ and target yaw rate Ψ'* shown in the following equation (1).

$$\varphi'^*/\theta = G\Psi'\bullet\{\ \omega_n^2(n_1S+1)\ \}/(S^2+2\zeta\omega_nS+\omega_n^2) \qquad \cdots\cdots \quad (1)$$

, wherein S denotes s Laplace transform operator, GΨ', ωn, n_1, and ζ denote vehicle speed dependent constants, namely, GΨ' denotes a yaw rate gain, ω_n denotes a natural (or specific) angular frequency, n_1 denotes a zero point corresponding (equivalent) value, and ζ denotes a damping coefficient. These vehicle speed dependent constants are set on the basis of a control map representing a correspondent relationship between a preset vehicle speed and each of the vehicle speed dependent constants.

Please replace paragraph 0032 with the following rewritten paragraph:

At a step 102, controller 4 refers to control maps each representing a correspondent relationship between a preset vehicle speed and corresponding one of the vehicle speed dependent constants and sets yaw rate gain GΨ', damping coefficient ζ, specific angular frequency ω_n, and a zero-point equivalent (corresponding) value n_1. As appreciated from Fig. 5, since the values set for each predetermined value is provided, when the detected vehicle speed ~~vehicular velocity~~ is rested on a point except a predetermined vehicle speed ~~vehicular velocity~~ on a map, a straight line (linear) interpolation derives a value between the maps so that each vehicle speed dependent constant is set.

Please replace paragraph 0037 with the following rewritten paragraph:

(Vehicle speed limiter processing during vehicle speed dependent calculation)

Next, the detailed explanation of step 102 shown in Fig. 4 will herein be made. The linear (straight line) interpolation is used to develop an error when respective vehicle speed dependent constants are set. Consequently, there is a possibility that a sense of incompatibility is given to the driver. The explanation is made on this phenomenon. To simplify this phenomenon, vehicle speed dependent constants are supposed to be set to the same values as the vehicle speed dependent constants that 2WS (rear left and right rear road wheels 2L and 2R are not steered) vehicle has. In a region equal to or below vehicle speed A shown in Fig. 5, target yaw rate $\Psi'*$ calculated on the basis of vehicle speed constants becomes equal to the yaw rate characteristic developed on 2WS (two wheel steering) vehicle. This target rear road wheel steering angle $\delta*$ calculated on the basis of target yaw rate $\Psi'*$ should be zeroed at a low speed region denoted by point A in Fig. 5. However, the control map representing vehicle speed and one of vehicle speed dependent constants has a value for each predetermined vehicle speed. Hence, a value between each vehicle speed point is derived through the linear interpolation. As shown by a map expanded view of Fig. 6, a region in which, strictly, an actual characteristic is not coincident with 2WS characteristic is present. For example, a difference $\Delta G\varphi'$ in characteristic between actual 2WS characteristic and characteristic line by means of the linear interpolation indicates p when, for example, vehicle speed is at a speed of a1. Difference $\Delta G\varphi'$ at a time of vehicle speed of a2 indicates zero. In addition, difference $\Delta G\varphi'$ when vehicle speed is at a steed of a3 is q (>p). Therefore, as target yaw rate $\varphi'*$ is different from the yaw rate characteristic developed on 2WS vehicle, rear road wheel steering angle command value $\delta*$ is calculated (except zero) having a certain value. This phenomenon gives the sense of incompatibility to the vehicle driver (even if the rear road wheel is developed, the influence is less since the rear road wheel steering angle is minute and gives a constant value). However, in a case where the vehicle ~~vehicular~~ speed is varied, the rear road wheel steering angle is varied (the error with respect to 2WS characteristics becomes large and/or small); this is varied due to a compensation for p $\rightarrow$ 0 $\rightarrow$ q or q $\rightarrow$ 0 $\rightarrow$ p) and, hence, there is a possibility that the sense of incompatibility is given to the driver).

Please replace paragraph 0038 with the following rewritten paragraph:

Then, if the vehicle speed at a time of referring to each of the control maps, each map representing the correspondence between the detection value of the vehicle speed and the corresponding one of the vehicle speed dependent constants, is moderately varied, an influence caused by the above-described interpolation error is suppressed. Specifically, as shown by a vehicle speed variation rate limit map of a steering angle absolute value-to-vehicle ~~vehicular~~ speed variation rate in Fig. 8, a vehicle ~~vehicular~~ speed variation rate limiter is provided for the map reference vehicle speed and the control command value calculation vehicle speed. An output of the vehicle speed variation rate limiter is placed to vehicle speed detection value V may be vehicle speed dependent constant map ~~refererence~~ reference vehicle speed Vmap. Hereinafter, a vehicle ~~vehicular~~ speed limiter process in the calculation of Vmap will be made on the basis of the flowchart of Fig. 7. That is to say, at a step 201, controller 4 sets a vehicle ~~vehicular~~ speed variation rate limit value dVlimit from an absolute value of steering angle $|\theta|$ as shown in Fig. 8. Since dVlimit denotes a value varied in accordance with absolute value $|\theta|$ of steering angle detection value, the value of limit value dVlimit is made smaller as absolute value of steering angle $|\theta|$ becomes larger and limit value of dVlimit becomes larger as absolute value of steering angle $|\theta|$ becomes smaller.

Please replace paragraph 0040 with the following rewritten paragraph:

In details, after, at step 203, controller 4 compares the first difference of the present value of vehicle speed (n) from map reference vehicle speed Vmap(n-1) with vehicle ~~vehicular~~ speed variation rate limit value dVlimit and, if $V(n) - \mathrm{Vmap}(n-1) > \mathrm{dVlimit}$ (Yes) at step 203, the routine goes to a step 204.

Please replace paragraph 0042 with the following rewritten paragraph:

If a second difference of the present value of vehicle speed V(n) from the previous value of the map reference vehicle speed Vmap(n-1) is larger than limit value dVlimit, namely, if ~~V(n) –~~ Vmap(n-1) – V(n) ≤ dvlimit (No at step 205), the routine goes to step 207. At step 206, controller 4 sets a value > dVlimit ($V - \mathrm{Vmap} > \mathrm{dVlimit}$) at step 205 (Yes), the

routine goes to a step 206. If ~~V(n)~~ – Vmap(n-1) – V(n) ≤ dvlimit (No at step 205), the routine goes to step 207. At step 206, controller 4 sets a value of subtraction of dVlimit from Vmap(n-1) as the present Vmap(n) (Vmap(n) = Vmap(n-1) –dVlimit). That is to say, if the variation in vehicle speed V becomes larger in a decrease direction, variation rate of map reference vehicle speed Vmap is limited by dVlimit. At step 207, the present detection value of the vehicle speed V(n) is set to Vmap(n) (Vmap = V). If the variation in vehicle speed is equal to or lower than the vehicle speed variation rate limit value of dVlimit at step 205(N0), the routine goes to step 207. If V- Vmap ≤ dVlimit (namely, V(n) – Vmap(n-1) ≤ dVlimit) (No) at step 203, the routine goes to step 207. Then, at a step 208, controller 4 reads each vehicle speed dependent constant (yaw rate gain GΨ', damping coefficient ζ, specific angular frequency ω_n, and zero-point equivalent value n_1) from each corresponding control map according to the set map reference vehicle speed Vmap(n) and the present process shown in Fig. 7 is ended.

Please replace paragraph 0043 with the following rewritten paragraph:

That is to say, when the control map representing the correspondence between the vehicle speed and vehicle speed dependent constant is referred to, a variation in vehicle speed becomes moderate and an ill influence of the linear interpolation between the values of the respective points present on respective maps on the vehicular motion can be suppressed. In addition, vehicle ~~vehicular~~ velocity variation rate limit value dVlimit is varied in accordance with absolute value |θ| of the steering angle so that a situation such that actual vehicle speed V and map reference vehicle speed Vmap are, at any time, made different can be avoided. That is to say, if the steering angle is returned to an approximately neutral state so that the vehicle runs on a straight line road to give V = Vmap. Hence, during the subsequent steering operation, the control is carried out starting from a state in which each vehicle speed dependent constant tuned previously at the present vehicle speed is used.

Please replace paragraph 0053 with the following rewritten paragraph:

When the vehicle was decelerated from a point A of vehicle ~~vehicular~~ speed, a steering operation of 45° was carried out at a time point of t1 and a deceleration of about

0.28G was carried out at a time point of t2. In addition, yaw rate gain $G\Psi'$ as one of vehicle speed dependent constants indicated the characteristics shown in Fig. 5, specific angular frequency ωn, zero-point equivalent value n_1, and damping constant ζ indicated the approximately same characteristics as 2WS in a range below vehicle speed A. In a case where, as appreciated from Figs. 10A through 10F, the limitation on the vehicle speed variation rate is not placed, a variation of target yaw angular acceleration $\Psi''*$ was large and rear road wheel steering angle command value $\delta*$ was varied.

Please replace paragraph 0055 with the following rewritten paragraph:

(Other Embodiments)

As described above, the vehicular motion control apparatus according to the present invention is not limited to the first embodiment described above. For example, the present invention is applicable to a vehicle in which a front road wheel steering angle providing section is mounted to provide the front road wheels with an auxiliary steering angle. Furthermore, the present invention is applicable to a vehicle in which a braking control section which is capable of controlling the vehicular yaw rate using a brake pressure difference between the left and right brake wheels. If the vehicle ~~vehicular~~ speed variation rate limiter is applied to each of the vehicles described above, a control target value (for example, target yaw rate, target lateral speed, or so on) is not varied quickly or abruptly. A further stable vehicular motion control can be achieved.